Percutaneous Nephrolithotomy in Patients over 65 Years

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Abstract

Renal calculus in the elderly patients is associated with the same symptoms and risks as in other patient populations. With the recent development of minimally invasive surgery many older patients can now be treated for renal calculi. This study was aimed to evaluate the usefulness, safety and efficacy of percutaneous nephrolithotomy performed in elderly patients.

We retrospectively evaluated and compared the data of 278 percutaneous nephrolithotomies (PNL) performed in our Department between January 1999. and January 2009.

Statistical analysis evaluated differences in terms of operation-related adverse events, stone-free success rates, and clinical success rates (including stone-free cases and cases with residual fragments <4 mm).

PNL in subjects over the age of 65 years is a safe and reliable technique that achieved a stone-free rate similar to those in younger patients, without any higher rates of complications or blood transfusions or longer hospital stay.

Key words: elderly patients, nephrolithiasis, percutaneous nephrolithotomy

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Introduction

The extension of life expectancy is one of the most dramatic achievemants of the 20th century. The elderly population, over 65 years, is the fastest growing age group. The implication of this population growth will need considerable medical and socioeconomic attention during the beginning of this century. A large proportion of elderly people are afflicted by several prevalent urological diseases such as benign prostatic hypertrophy, incontinence or nephrolithiasis. Renal calculus in the elderly patient is associated with the same symptoms and risks as in other patient populations. With the recent development of minimally invasive surgery many older patients can now be treated for renal calculi without the risks of major surgical procedure. This study was aimed to evaluate the usefulness, safety and efficacy of percutaneous nephrolithotomy (PNL) performed in elderly patients.

Patients and methods

The medical records and radiographs of PNLs performed over a 10 year period were reviewed. Between January 1999 and January 2009, 261 patients with nephrolithiaisis were subjected to PNL in the Department of Urology, Clinical Hospital Center Rijeka, Croatia. Of them, 53 were older then 65 years and 208 were younger then 65 years (table 1). In the group of elderly patients ages ranged between 65 and 84 years with a mean age of 76 years. In the group of younger patients ages ranged between 18 and 65 years with a mean age of 53 years.

Table 1. *The characteristics of patients and stones*

	Age, years		
	<65	**≥65**	**Total**
Number of patients	208	53	261
Male	112	26	138
Female	96	27	123
Stone location:			
upper calyceal	0	0	0
mid-calyceal	28	6	34
lower calyceal	67	19	86
renal pelvic	113	28	141
Stone size, mm:			
<20	32	9	41
≥20	176	44	220

We evaluated and compared records of all patients analyzing comorbidity, median ASA score, mean stone diameter and location, preoperative and postoperative serum creatinine and haemoglobin level, mean hospital stay and success rates (stone-free patients and patients with residual stones <4 mm).

Every patient received prophylactic antibiotic prior to surgery and the antibiotic was continued after surgery until the nephrostomy tube was removed. They all had normal prothrombin time, partial thromboplastin time and platelet count documented prior the surgery. All procedures were done under general anesthesia. A preliminary cystosopy and retrograde catheterization of the affected side was done initially. This was followed by the puncture and establishment of the percutaneous access under ultrasound or fluoroscopy guidance, after opacification of the pelvicalyceal system. Ultrasound, pneumatic and electrohydraulic lithotripsy were used. "JJ" stents were inserted whenever significant fragments (>4 mm) were left behind, which in turn were treated with Extracorporal Shock Wave Lithotripsy (ESWL). Monotherapy with PNL failed in some patients, either due to failed access or failure of stone disintegration. Plain radiograms, antegrade urograms and ultrasound were used to assess the residual fragments during the hospital stay. All patients were followed until they were free of stones or left with insignificant residual fragments.

Statistical analysis (χ^2 test) evaluated differences in terms of operation-related adverse events and clinical success rates (including stone-free cases and cases with residual fragments <4 mm).

Results

In 10 years period 284 PNLs were performed on 261 patients. 56 procedures were performed in elderly patients and 228 procedures were performed in younger patients. Two groups had similar distributions with regard to sex, past medical hystory, mean stone diameter and location. Their features and characteristics are shown in table 1 and table 2. The mean stone diameter was similar in both the elderly (2,2 cm) and the younger (1,9 cm) patient cohort. There were no significant differences in stone location between these two groups. Urinary tract infection, hypertension and diabetes were the most common medical problems.

Table 2. *Past medical hystory of patients undergoing percutaneous nephrolithotomy*

	Patients ≥65 years	%	Patients <65 years	%
Urinary tract infection	17	32	58	28
Obstructive uropathy	2	4	1	0.4
Renal insufficiency	2	4	1	0.4
Coronary artery disease	4	8	10	5
Hypertension	15	28	48	23
Diabetes	5	9	12	6

Perioperative complications were encountered in 42% (elderly patients) and 37% (younger patients) of cases and are shown in table 3. Postoperative fever, collecting system perforation and renal haemorrhage were the most common perioperative adverse events and showed similar distribution between two groups.

Table 3. *Complications following percutaneous nephrolithotomy*

	Patients ≥65 years	% of procedures	Patients <65 years	% of procedures
Postoperative fever (≥38°C)	13	23	48	21
Sepsis	0	0	1	0.4
Renal collecting system perforation with extravasation	7	12	23	10
Renal haemorrhage	4	7	11	5
Adjacent organ injury	0	0	0	0

The average hospital stay was 9 days and mean ASA score was 2 for both groups of patients. There were no statistically significant differences in serum creatinine and haemoglobin level before and after the procedure.

An overall success rate for PNL as monotherapy for nephrolithiasis was 78% in elderly group and 83% in younger group. Patients with significant residual stones were further managed successfully with ESWL. PNL failed in 2 cases (one in elderly group and one in younger group) and they were managed with open surgery. Failed puncture was the main cause for abandoning the procedure.

Discussion

The present results show that PNL in patients over the age of 65 years is a safe and reliable technique that achieved a stone-free rate similar to that obtained in the younger patients, without any higher rates of complications or longer hospital stay.

Although there are many reports discussing various factors affecting the clinical outcome of PNL, patient age is mentioned infrequently. In a recent study Anagnostou1 evaluated two groups of patients, those aged between 17 and 69 years and those over 70 years. No statistically important differences were found between the two groups in terms of stone burden before surgery, adverse events rates, complete stone-free rates, and clinical success rates. In previous report Dorè[2] did a retrospective study of 203 patients over the age of 70. A history of stones and diabetes influenced the stone-free rate, but the other comorbidities, body mass index, and age did not influence the stone-free rate. In an early study Sahin [3] retrospectively evaluated and compared the data of 28 PCNL performed on 27 patients aged 60 years and older with the data of the 178 PCNL procedures performed in patients aged 59 and younger. The stone burden and the success rates were similar for the two groups. No significant complication was observed in elderly group, and no renal deterioration has been detected. We report on clinical success rate of 78% which is similar to that reported in previous studies [2,3].

Percutaneous nephrolithotomy (PNL) is accepted as the procedure of choice for the treatment of large or complex renal calculi. Since its introduction in 1976 [4], the operative technique and the endoscopic equipments have had constant evolution, increasing the success rates and decreasing complications and morbidity.

In our study postoperative fever, collecting system perforation and renal haemorrhage were the most common complications and our results appear to be similar with other studies [5]. Postoperative fever can occur as a result of infection introduced via the access to the kidney or if the stones are infected. Prophylactic antibiotics and draining of a pyonephrotic kidney before performing PNL is mandatory. Antibiotics can be applied by single-dose or short-course prophylaxis protocols. It is also important to prevent a high pressure in the collecting system and to keep the duration of operating time to a minimum.

A common source for a renal haemorrhage during PNL is the nephrostomy tract itself. These bleedings can be prevented if the kidney is strictly punctured through a calyx and a minimal angulation of the dilation system and nephroscope shaft is used. Lacerations can occur during the dilation of the tract and

during definitive surgery in terms of stone removal.

Perforation of the collecting system is the common source for extravasation and fluid absorption. Major perforation of the collecting system usually involves the medial wall of the renal pelvis and is heralded by the appearance of yellow fat. Depending on the size of the perforation, it might be possible to complete the procedure, but with more significant injuries the procedure should be terminated and a large-bore nephrostomy tube and ureteric stent should be inserted.

Renal function impairment is expected to be common in the geriatric patient population since they already have lower basal renal function. Since PNL is a surgical intervention, it may show deteriorative effects on renal function in the early postoperative period. In the present study, no renal deterioration has been detected in the follow-up of patients.

In the past, major surgery was the only treatment option for patients with nephrolithiasis6. However, many men have been fearful of surgery and its side effects. Now that a significant shift toward minimally invasive treatment of nephrolithiasis has occurred in recent years, many more individuals can now be successfully treated. Minimally invasive surgical interventions have demonstrated long-term success and body of evidence suggests that they are highly effective.

Conclusions

At this point, we have data that doesn't indicate a higher risk of PNL in subjects over the age of 65 years. On the contrary, it seems to be a safe procedure and may achieve a stone-free rate up to 80%. We propose a rigorous preoperative medical evaluation and control of the comorbidities in order to reduce the operative risk.

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